Washington Department of FISH and WILDLIFE

Drought Status Update #26
September 18, 2015

Note: This material is intended for, and contains elements of special interest to, WDFW agency staff. Non-agency readers or anyone having questions about the context, clarity, or content for items in this update should contact the author, WDFW Drought Response Lead Teresa Scott at (360) 902-2713 teresa.scott@dfw.wa.gov

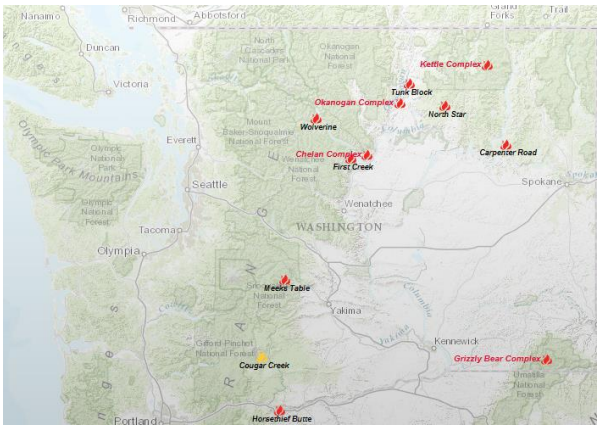
The impacts of end-of-August precipitation are fading throughout Washington, and streamflows have returned to pre-rain levels. With cooler, wetter weather forecast for the extended 8 to 14 day outlook, many salmon followers are hoping that rains continue to bolster streamflows. The weekly update by the Office of the Washington State Climatologist (OWSC) provides more on the winter-spring temperature outlook.

This September 11 newspaper ad (right) from Seattle Public Utilities hit home on our continuing messages about drought. Many people are ready to declare the drought over, but the fish are still struggling against drought conditions in many Washington streams.

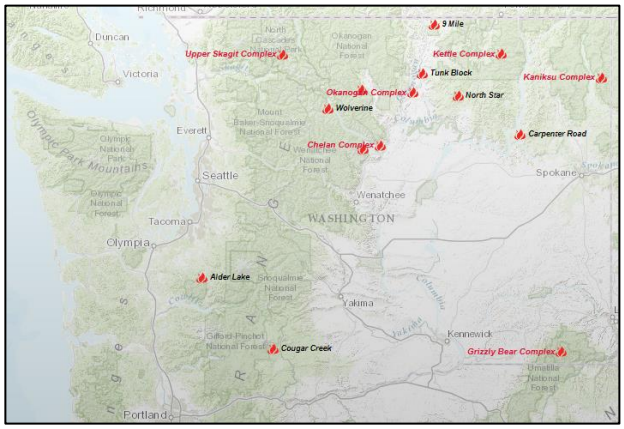
Severe Hazards

This week's fire incidents map (below) from the Northwest Interagency Coordination Center shows fewer fires in Washington. Inciweb reports 29 active fires in Washington as of September 17. Again this week there are no NWS Severe Weather Hazards predicted for the next 24 hours in Washington (other than small craft warnings off the coast).

NWCC incident map for September 17



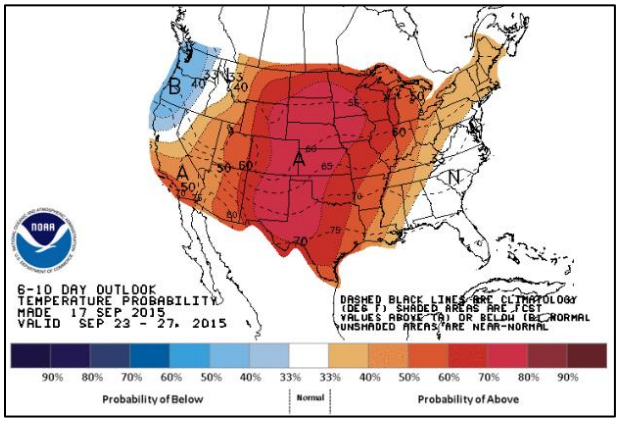
Incident map for September 10



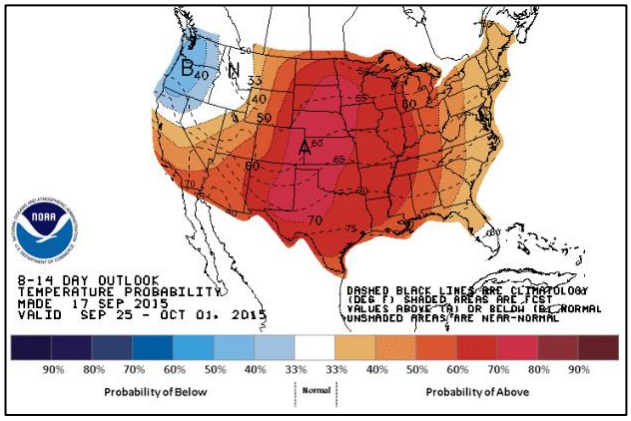
Temperature Forecasts

The 6-to-10 day temperature outlook shows **below-normal** temperatures throughout Washington, with more of the same in the 8-to-14 day temperature outlook.

6-10 day forecast on 9/17 for Sep 23-27

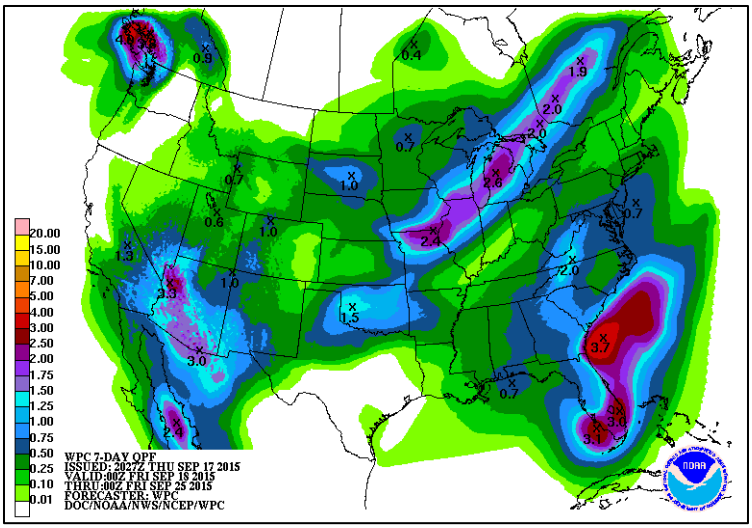


8-14 day forecast on 9/17 for Sep 25-Oct 1



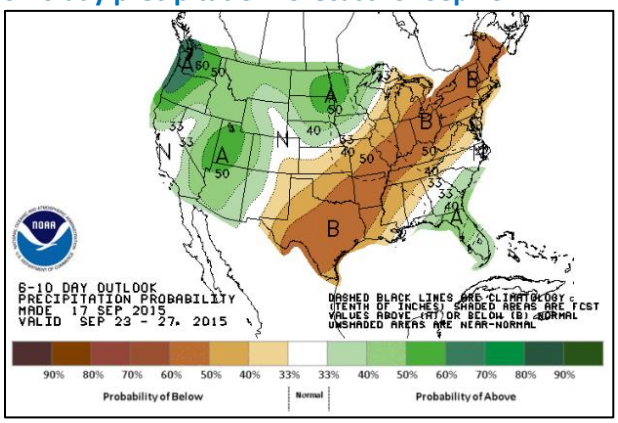
Precipitation Forecasts

Eastern Washington is not forecast to receive precipitation over the coming week, but up to 1.25 inches is expected for west of the Cascade Mountains (right).

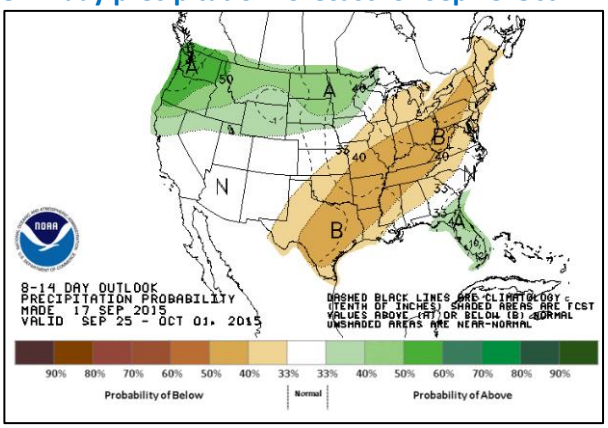


The 6-to-10 day probability of precipitation (below) is **above-normal** statewide, and this carries through to the 8-to-14-day precipitation probability outlook.

6-10 day precipitation forecast for Sep 23-27

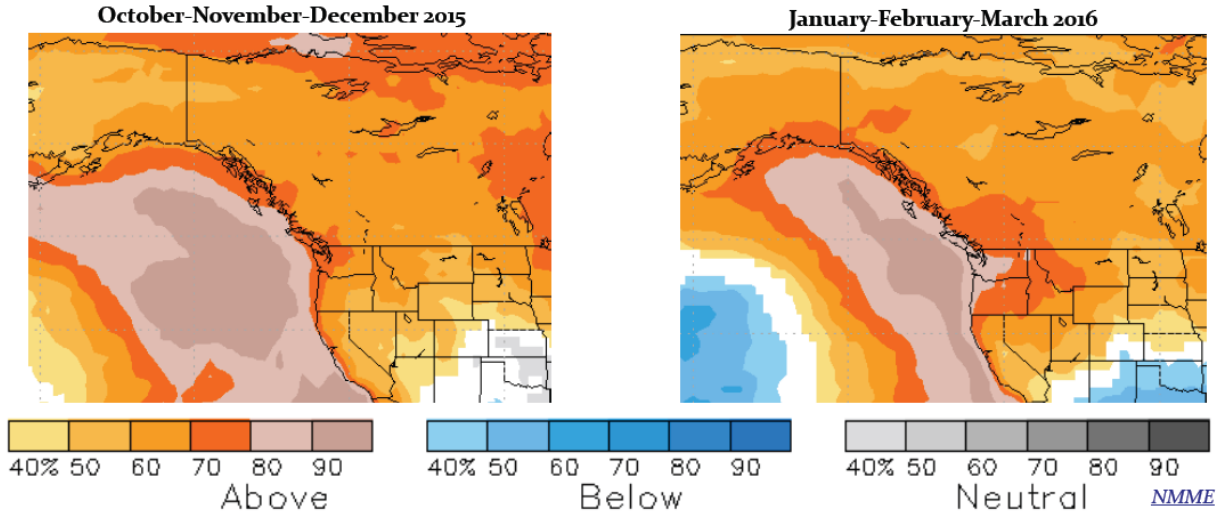


8-14 day precipitation forecast for Sep 25-Oct 1



Climate Predictions

Here's a slightly different representation of the temperature outlooks for the coming winter and spring, provided by the Office of the State Climatologist in their September 17 update. Please refer to that update for an overview of this slightly different perspective. The North American Multi-Model Ensemble (NMME) web pages are enough to keep climate geeks busy and your author completely baffled. Our old favorites, the seasonal climate outlooks, are still available for your perusal should you prefer that format.



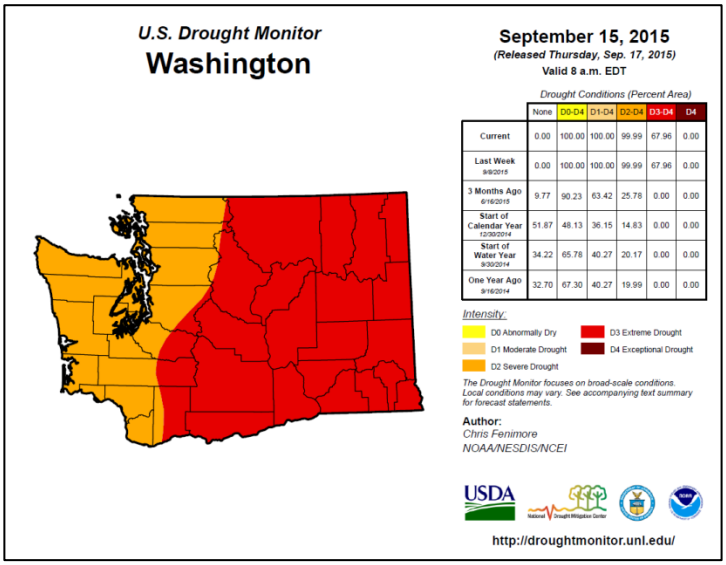
Don't lose sight of the general outlook, which is for warmer- and drier-than-normal conditions for this fall and winter, turning to normal precipitation (but still warm temperatures) in late spring 2016.

El Niño Update

The September 10th El Niño/Southern Oscillation diagnostic discussion predicts El Niño to continue in the northern hemisphere into spring 2016, with a peak in late fall/early winter (3-month sea surface temperature values of +1.5°C or greater). The next El Niño/Southern Oscillation update will be issued October 8, 2015. The NOAA Climate Prediction Center (CPC) and the International Research Institute for Climate and Society at Columbia University (IRI) partner to develop ENSO forecasts. IRI sponsors a website with coherent El Niño Southern Oscillation (ENSO) resources and discussions, and is worth a look if you're interested to dig into this topic further.

Federal Drought Status

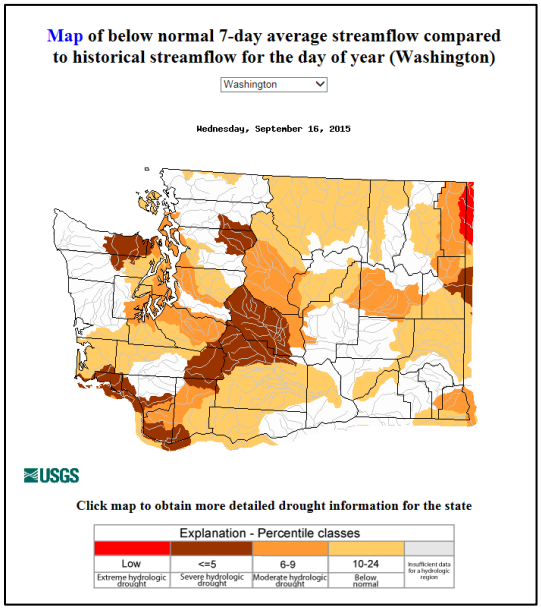
There were no changes in Washington's drought status this week. The U.S. Drought Portal provides the weekly drought status for the nation. Find out more about U.S. Department of Agriculture disaster status and relief programs at the USDA Disaster Assistance web page.



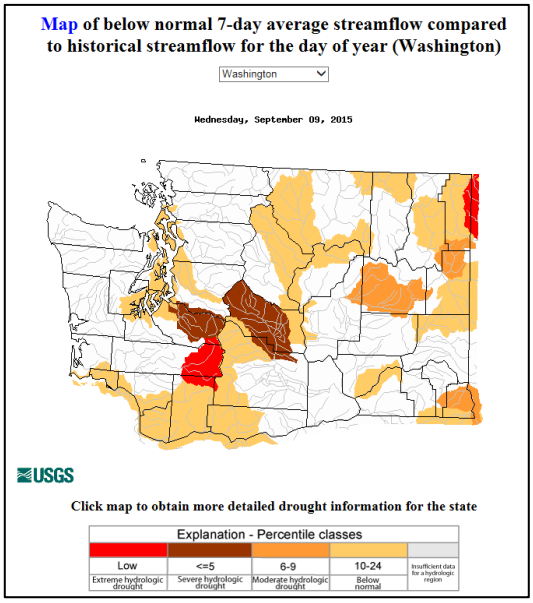
Stream Flows

The USGS figure showing stream gauges with below normal streamflow for 7 days or more shows streamflows creeping back to below-normal conditions in much of the state this week. What does it say when "back to below-normal" is the new "normal?" Well, it's only normal for drought years!

Below-normal 7-day average stream flow
September 16, 2015



Below-normal 7-day average stream flow
September 9, 2015



Selected Washington Streamflows Table

Only Cowlitz at Packwood, out of our select set of 43 locations, shows a record low flow for this morning, September 18. Again, under normal circumstances it would seem odd to celebrate such low achievement, but your writer is personally thrilled to welcome flows back into the realm of historic ranges.

This Statewide Streamflows tables from USGS gives a quick visual reference for daily flows as a percent of normal for this date in the historic record. We selected 43 out of a total of 254 flow gauges in Washington as a subjectively representative sample of Washington conditions. The

first column shows the gauge location, the second column shows today's stream flow readings, the third column shows today's flows as a percentage of average flows for this date throughout the period of record, column four shows the (previous) minimum flow for this date, and the fifth column shows in what year that minimum occurred. Colors in the table emphasize flows less than 100% of average (orange-yellow) and less than 50% (red) for this day in the record. Flows at 100% or more of average are green-colored, changed from 75% or more in previous versions.

SELECTED WASHINGTON STREAMFLOWS FOR 43 OUT OF 254 GAUGES IN WASHINGTON	TODAY'S FLOW (CFS)	PERCENT OF AVERAGE FOR THIS DATE IN THE RECORD	MIN FLOW (CFS)	YR OF MIN FLOW	MEAN FLOW (CFS)
Mf Nooksack River Near Deming, Wa	145	30%	59	1992	477
Nooksack River At Ferndale, Wa	1,050	54%	763	1986	1,950
Skagit River Near Concrete, Wa	7,170	83%	4,070	1973	8,690
Sauk River At Darrington, Wa	495	70%	450	1928	712
Cascade River At Marblemount, Wa	260	54%	261	2006	483
Nf Stillaguamish River Near Arlington, Wa	370	46%	130	1938	796
Snoqualmie River Near Carnation, Wa	683	47%	367	1973	1,440
Skykomish River Near Gold Bar, Wa	556	37%	349	2007	1,490
Issaquah Creek Near Mouth Near Issaquah, Wa	29	81%	17	1992	36
Cedar River Below Diversion Near Landsburg, Wa	140	76%	132	1992	185
Cedar River At Renton, Wa	148	64%	43	1958	232
Big Soos Creek Above Hatchery Near Auburn, Wa	45	136%	18	2012	33
Green River Near Auburn, Wa	333	88%	183	1969	380
South Prairie Creek At South Prairie, Wa	33	43%	27	1951	77
Puyallup River At Puyallup, Wa	890	54%	799	1992	1,640
Nisqually River At Mckenna, Wa	600	107%	156	1952	561
Deschutes River Near Rainier, Wa	25	54%	21	2006	46
Nf Skokomish R Bl Staircase Rpds Nr Hoodsport, Wa	83	54%	23	1930	153
Dungeness River Near Sequim, Wa	102	61%	92	2005	166
Hoko River Near Sekiu, Wa	37	27%	11	2014	139
Calawah River Near Forks, Wa	107	52%	40	1898	206
Hoh River At Us Highway 101 Near Forks, Wa	738	62%	420	2005	1,200
Satsop River Near Satsop, Wa	504	106%	184	1938	474
Chehalis River Near Grand Mound, Wa	201	55%	110	1951	368
Naselle River Near Naselle, Wa	37	39%	19	2014	94
Cowlitz River Below Mayfield Dam, Wa	2,520	97%	1,080	1967	2,610
Cowlitz River At Packwood, Wa	194	35%	245	2005	559
Lewis River At Ariel, Wa	867	42%	630	1931	2,080
White Salmon River Near Underwood, Wa	493	79%	304	1942	624
Klickitat River Above West Fork Near Glenwood, Wa	82	82%	56	2001	100
Walla Walla River Near Touchet, Wa	18	45%	2	1988	40

Tucannon River Near Starbuck, Wa	69	99%	40	1929	70
Grande Ronde River At Troy, Or	555	75%	430	1988	736
Yakima River At Kiona, Wa	724	40%	774	1979	1,830
American River Near Nile, Wa	35	63%	32	1992	56
Crab Creek At Irby, Wa	1	15%	0	1973	8
Wenatchee River At Plain, Wa	280	43%	229	2005	649
Methow River Near Pateros, Wa	256	60%	210	1973	429
Okanogan River At Malott, Wa	562	51%	331	1988	1,110
Okanogan River At Oroville, Wa	246	46%	61	1944	540
Spokane River At Spokane, Wa	750	43%	563	1973	1,750
Colville River At Kettle Falls, Wa	57	59%	23	1930	97
Pend Oreille River Below Box Canyon Near Ione, Wa	8,530	58%	5,210	2006	14,700

Real-Time Water Temperature from USGS and Ecology

Water temperatures are down across the state, as is appropriate for this time of year. There are no stations reporting temperatures above 20 degrees C!!! Duwamish River at the golf course is 15 degrees C this morning (9/18) and Okanogan River at Malott is 16.3 degrees. Lake Osoyoos (Canadian Okanagan) and the Snake and Columbia River mainstems continue to struggle with temperatures in the upper teens.

USGS doesn't collect Real Time water temperature at every stream flow gauge in Washington, but the sixty-five gauges that do include water temperature provide extremely helpful information to stream watchers and fish managers. Follow this link to see the Real Time Temperature Stations map for Washington. Below is a table showing September 10 water temperature at all Washington gauges having that attribute, in degrees C. Colors emphasize lethal (red, above 20 degrees C), dangerous (yellow, above 18 degrees), and acceptable (green) temperatures for salmon. Note that this sample of gauges is heavily weighted by stations at Columbia-Snake hydropower facilities, so statistics like *percent-of-Washington-gauges* would not be representative of overall status in Washington.

WATER TEMPERATURE FOR 65 GAUGES IN WASHINGTON ON SEPTEMBER 10, 2015	**DEGREES C**
Nf Skokomish R Bl Staircase Rpds Nr Hoodsport, Wa	9.7
White River At Headworks Ab Flume Nr Buckley, Wa	10.6
White River At R Street Near Auburn, Wa	11.6
Lake Tapps Diversion At Dieringer, Wa	12.1
Ysi 6920v2-2 At Wsu 2 At Puyallup, Wa	10.6
Duwamish River At Golf Course At Tukwila, Wa	15
Cedar River Near Cedar Falls, Wa	10.2
Cedar River At Cedar Falls, Wa	15.2
Cedar River Below Diversion Near Landsburg, Wa	11.3
Cedar River At Renton, Wa	12.7
South Fork Sultan River Near Sultan, Wa	9.5
Sultan River Below Diversion Dam Near Sultan, Wa	12.3
North Fork Tolt River Near Carnation, Wa	10.5

South Fork Tolt River Near Index, Wa	9.8
South Fork Tolt River Near Carnation, Wa	11.8
Sf Tolt River Bl Regulating Basin Nr Carnation, Wa	11.6
Nf Stillaguamish East Pooled Slide Area Nr Oso, Wa	6.4
Skagit River At Newhalem, Wa	10.3
Skagit River At Marblemount, Wa	10.4
Nf Nooksack River Bl Cascade Creek Nr Glacier, Wa	8.5
Sf Nooksack River At Saxon Bridge, Wa	12.2
Nooksack River At North Cedarville, Wa	11.4
Boundary Reservoir At Forebay Nr Metaline Falls	17.1
Pend Oreille River At International Boundary	17.1
Columbia River At Bridgeport, Wa	18.1
Ninemile Creek Near Oroville, Wa	
Osoyoos Lake Near Oroville, Wa	18
Okanogan River At Oroville, Wa	17
Similkameen River Near Nighthawk, Wa	14.4
Okanogan River Near Tonasket, Wa	15.4
Okanogan River At Malott, Wa	16.3
Okanogan River Nr Wakefield Br South Of Malott, Wa	14.8
Andrews Creek Near Mazama, Wa	6.4
Methow River Near Mouth Near Pateros, Wa	12.3
Wells Powerplant Headwater Near Pateros, Wa	18.1
Wells Powerplant Headwater Near Pateros, Wa	17.9
Wells Powerplant Headwater Near Pateros, Wa	17.9
Snake River Bl Mcduff Rapids At China Gardens, Id	19.6
Snake River Near Anatone, Wa	19
North Fork Clearwater River At Ahsahka, Id	9
Clearwater River Nr Peck Id	11.9
Clearwater River Nr Peck Id	11.8
Clearwater River Near Lewiston, Id	11.3
Lower Granite Lk Forebay At Lower Granite Dam, Wa	18.6
Snake River (Right Bank) Bl Lower Granite Dam, Wa	17.6
Lake Bryan Forebay At Little Goose Dam, Wa	18.4
Snake River Below Little Goose Dam, Wa	18.2
Lake H G West Forebay At Lower Monumental Dam, Wa	18.3
Snake River Below Lower Monumental Dam, Wa	18.3
Snake River Bl Goose Island Bl Ice Harbor Dam, Wa	19.3
Columbia River Below Mcnary Dam Near Umatilla, Or	19.3
Columbia River At The Dalles, Or	19.1
Columbia River, Right Bank, At Washougal, Wa	18.5
Columbia River At The Dalles Dam Forebay, Wa	18.8
Columbia River At Bonneville Dam Forebay, Wa	18.8
Columbia River At Cascade Island, Wa	18.9
Columbia River, Right Bank, Near Cliffs, Wa	19.2
Columbia River At John Day Dam Navigation Lock, Wa	19.7

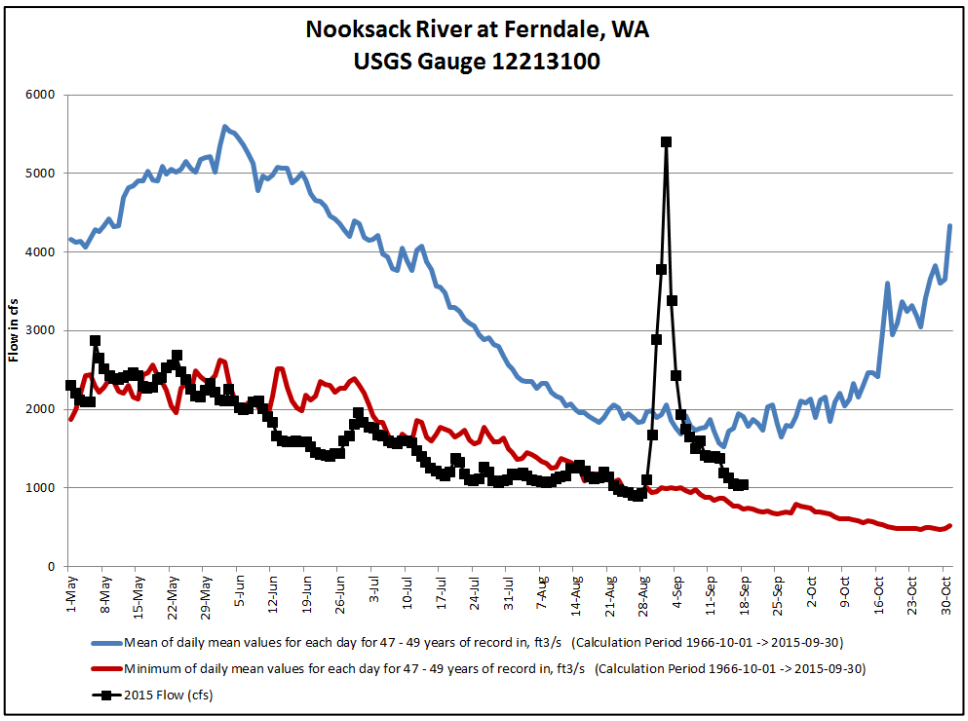
Ecology's Flow Monitoring Network provides water temperature monitoring at several Ecology and co-op stations. Definitely check out whether there is an Ecology gauge in your area and spend a little time looking at the information. Data for the Lake Washington Ship Canal can be found here.

Drought Impacts to Fish and Wildlife

Some emergency fishing closures have been rescinded now that temperatures are cooling in Washington streams. WDFW's latest drought news regarding fishing and hydraulic projects closures and restrictions can be found at http://wdfw.wa.gov/conservation/drought/ .

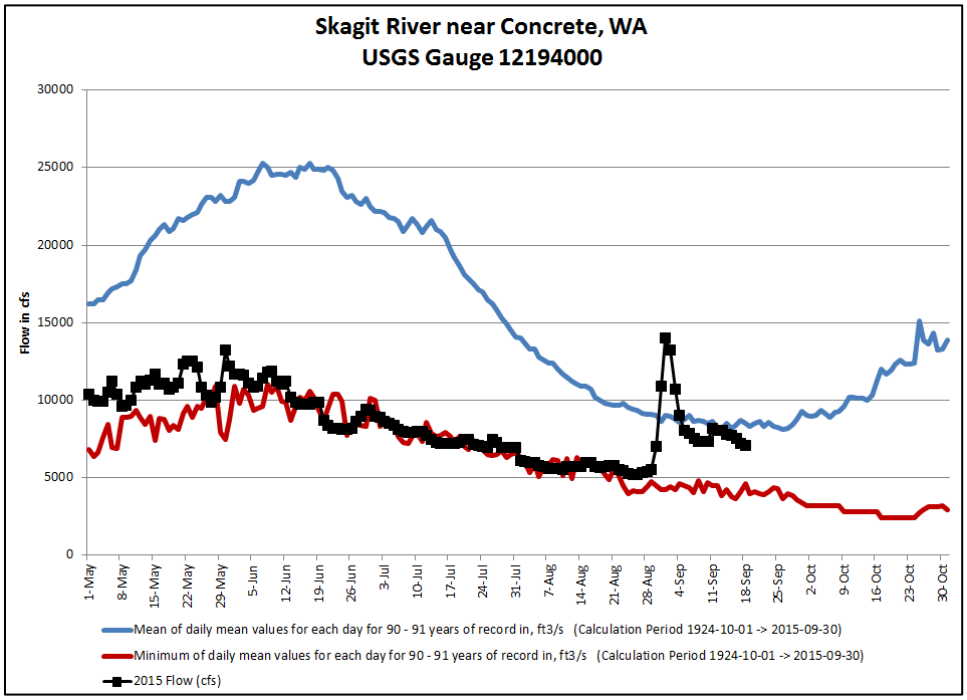
Nooksack River

Nooksack flows at this gauge perked quite a bit with the August 31 rains, but are dropping again into low-flow territory. So far, flows haven't returned to their record-low levels - we will see if that holds through the fall. On the Nooksack, Ecology had actively curtailed 9 water rights as of August 28th.



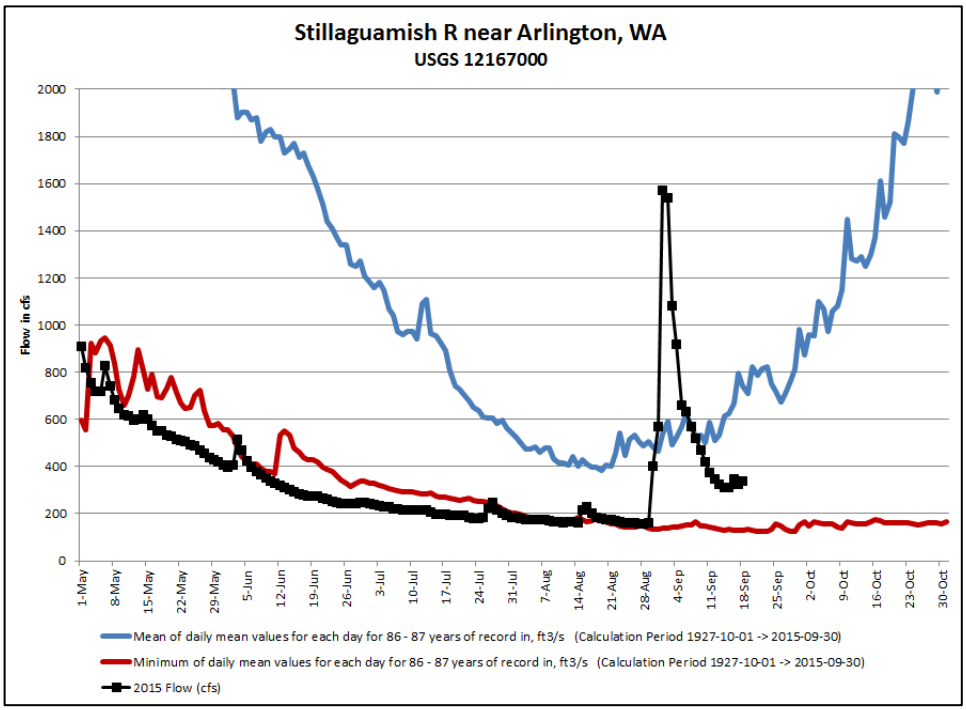
Skagit River

Skagit rain response and recovery are similar to the Nooksack and other westside systems. Skagit flows at this gauge are staying closer to the historic mean, though, which is good news for returning fish. Ecology has sent 3 letters warning water users of potential for curtailment as of 8/28.

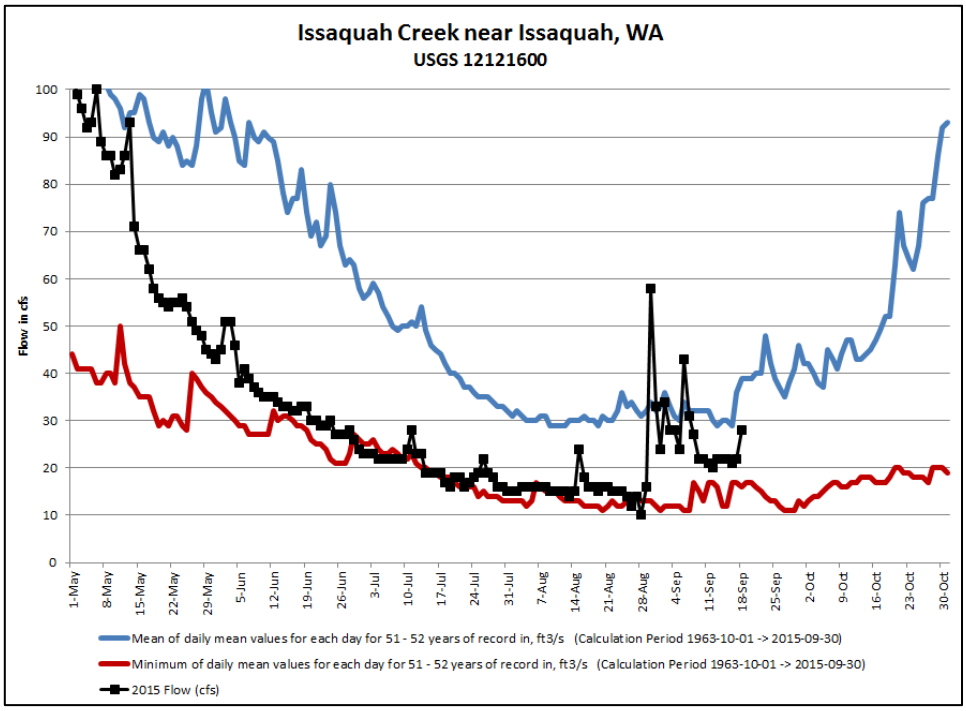


Stillaguamish

Stillaguamish flows are recovering to levels right in the middle of the below-average range. Data over the next week or two should tell us whether the Stillaguamish hydrograph will increase on schedule.



Lake Washington/Cedar



Post-rain flows on Issaquah Creek are staying satisfyingly closer to the historic average compared to pre-rain flows. There are good numbers of chinook returning to Issaquah Hatchery, which this writer visited last Friday. One way I know I don't get out enough is that those big chinook hanging out in the creek downstream from the adult intake had me very excited for fall, as did the giant jumpers in the pond awaiting spawning.

WDFW is lucky to have an amazing partnership with Friends of the Issaquah Fish Hatchery (FISH), whose volunteers pitch in during spawning season and provide hatchery facility tours to adults and students year round. I spoke at a FISH-sponsored "Public Officials Day" themed around drought and climate change, along with Lara Whitely Binder from the Climate Impacts Group at the UW. Lara's fascinating science information got most of the audience attention, but one question I'm still researching is how citizens and local water districts can help wildlife that might be approaching residential areas searching for water. Wildlife sightings in Sammamish (which much to my chagrin is actually a city of 60,000 now) neighborhoods brought this question to the fore.

King County Flow and Temperature Conditions September 7 through September 13

Following is a report compiled by Curtis DeGasperi and distributed by Jim Simmonds from King County Department of Natural Resources and Parks. King County presents weekly summaries on King County river and creek flows and temperatures. Get more information about this report from Jim.Simmonds@kingcounty.gov or Curtis.DeGasperi@kingcounty.gov. Curtis and Jim would especially like feedback on what readers liked, wanted but didn't see, etc. Please let them know how much you appreciated their having shared this information with WDFW this summer! Note that King County plans to discontinue these weekly updates after next week.

HEADLINES FROM THE WEEK

Although Western Washington has received above normal precipitation over the past couple of weeks and the wet weather has resulted in cooler air and stream temperatures; Seattle, Everett, Tacoma and Cascade Water Alliance ask customers to continue to reduce their water

use as the welcome precipitation has not resulted in an increase in the amount of water stored in our water supply reservoirs. Over the four weeks prior to September 9th, the region has collectively cut back on water use by 14 percent. These utilities are grateful for the actions residents and businesses have taken to reach that point and ask customers to continue to reduce their water use. More information available here: **http://www.seattle.gov/util/MyServices/Water/AbouttheWaterSystem/WaterSupply/index.htm.**

A recent article on InvestigateWest described some preliminary results of climate impact studies on Seattle Public Utility water supply reliability. Story here: http://invw.org/2015/09/09/climate-change-is-darkening-seattles-water-forecast/

WATER SUPPLY STATUS

- The second stage water shortage response plan (voluntary reduction) initiated on August 11 by Seattle, Everett, Tacoma, and the Cascade Water Alliance remains in effect. Customers have been asked to continue to help by voluntarily reducing water use by 10 percent. More information available here: http://www.seattle.gov/util/MyServices/Water/AbouttheWaterSystem/WaterSupply/index.htm and here http://www.savingwater.org/.
- As of September 8, Seattle Public Utilities (SPU) reports that the combined reservoir storage of Chester Morse Lake, Masonry Pool, Lake Youngs and South Fork Tolt Reservoir remains below the long term average for this time of the year. See summary graphs from SPU below.
- Cascade Water Alliance has been maintaining the agreed-upon recreational level for Lake Tapps (http://cascadewater.org/news/lake-tapps-news/ for more information). The lake is now within the agreed-upon recreation level. However, minimum instream flows in the White River below the diversion to Lake Tapps were not generally met last week (see White River flow graph below).

FLOW AND TEMPERATURE STATUS

- The effect of the late August/early September rain dissipated as flows diminished after a week of relatively dry weather; of 16 rivers and 24 creeks with over 15 years of flow data and real-time data delivery, only four had above average flows for this time of year (down from 18 last week). Twelve creeks and 11 rivers were typical for this time of year, though six creeks and two rivers still had record low flows.
- Only 1 of the 16 rivers/streams with over 15 years of temperature data and real-time data delivery had the highest temperatures ever recorded for the week (Jenkins), though 11 of the 16 were still higher than typical for the week. No temperatures exceeded 20°C.
- Water levels in Lakes Washington and Union did not decrease substantially over the past week, remaining above 20 ft. For the week of September 7 to September 13, the 2015 levels are the 7th lowest on record (1940-2015). Maximum daily water temperatures at the fish ladder at the Ballard Locks have dropped below 20°C, reaching the average temperatures for the week of September 7 to September 13 (2004-2015). See figures below.

- The elevation of Lake Sammamish is the fourth lowest since the weir modification in 1998 and is ~ 1 inch below the median lake elevation (1999-present) for the week of September 7 to 13. See figure below.

ECOLOGICAL IMPACTS

- Data collected by the Muckleshoot Tribe show that 5,414 adult Chinook salmon and almost 34,000 sockeye salmon had migrated past the Ballard Locks into the Lake Washington watershed as of September 13. This is about 49% of the 10-year average Chinook return and about 27% of the 10-year average sockeye return by September 13. Over the past 10 years, an average of about 96% of the Chinook run and almost 100% of the sockeye run had passed the Ballard Locks by September 13. Coho have also begun to appear at the locks with 3,193 counted since the beginning of September.
- Starting in mid-August, over 600,000 pink salmon are projected to return to the Green/Duwamish and over 1.6 million pink salmon are projected to return to the Snohomish River. Recreational salmon fishing has opened on the Snoqualmie and Green-Duwamish rivers, including fishing for pink salmon. 2015 pink run size will be estimated based on spawning ground surveys conducted in mid-September. We have no quantitative information on the current run, but returning pink salmon have been observed in both rivers.

REGULATORY AND LEGAL CONSIDERATIONS

- The increase in the flow of the Snoqualmie River above the minimum instream flow levels last week was temporary. Flows have again fallen below the instream flow target. See figure below.
- The Green River at Auburn had a similar response as the Snoqualmie with a decline in flow over the last week. Flows remain higher than instream flows required during drought years for Tacoma Public Utilities to withdraw water from the Green River using its primary water right claim under agreements with the Muckleshoot Tribe, but are still below the minimum instream flow for Tacoma Public Utilities to withdraw water from the Green River with its second diversion water right claim. See figure below.
- Flows in the Cedar River remain higher than the normal minimum flow required by the Habitat Conservation Plan to be maintained by Seattle Public Utilities during normal years. See figure below.
- Flows in the White River were generally below the minimum flow required by the White River Management Agreement between the Puyallup Tribe of Indians, the Muckleshoot Indian Tribe and the Cascade Water Alliance. See figure below.

River Flow Summary

Status	Regulated Rivers*	Unregulated Rivers
Lowest flow ever for week		White River above Mud Mountain, Sammamish
Lower flow for the week	Cedar at Renton	Cedar above reservoir

than during 90% of other years		
Below typical flow for week	Cedar below reservoir	
Typical flow for week	Green (at Auburn), SF Tolt (below reservoir)	Raging, SF Snoqualmie, MF Snoqualmie, NF Snoqualmie, Snoqualmie (mainstem at Carnation), Skykomish, Tolt (mainstem near Carnation), NF Tolt, SF Tolt above reservoir

Creek Flow Summary*

Status	WRIA 8	WRIA 9	WRIA 10
Lowest flow ever for week	Rock (near Ravensdale), Taylor (Selleck)	Covington, Little Soos, Soosette	Boise
Below typical flow for week	Rock (Maple Valley), Thornton		
Typical flow for week	Bear, Issaquah (at mouth), Juanita, Mercer, McAleer, Laughing Jacobs	Judd, Crisp, Mill (Kent), Des Moines, Des Moines trib (at Tyee Weir), Jenkins	
Above typical for week	Lyon, Issaquah (near Hobart)		
Higher flow for week than during 90% of other years		Big Soos, Springbrook	

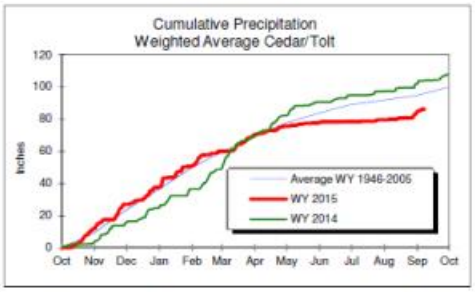
*No creeks in WRIA 7 have 15 years of flow data and real-time data delivery

River and Creek Temperature Summary

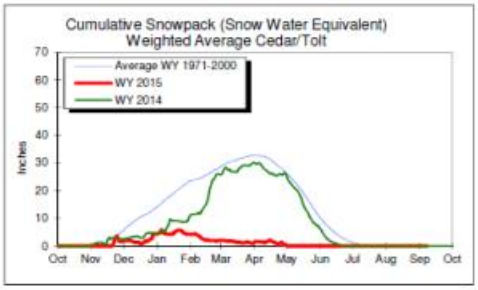
Status	River/Creek*
Highest temperatures ever for week	Jenkins
Temperatures for week higher than during 90% of other years	SF Tolt (below reservoir), Cedar (above reservoir and at Renton)
Higher than typical temperatures for week	Cedar (below reservoir and below diversion), NF Tolt, Bear, Laughing Jacobs, Covington, Judd
Typical temperatures for week	SF Tolt (above reservoir), Little Soos, Soosette, Crisp, Juanita

*Juanita Creek returns this week – telemetry restored.

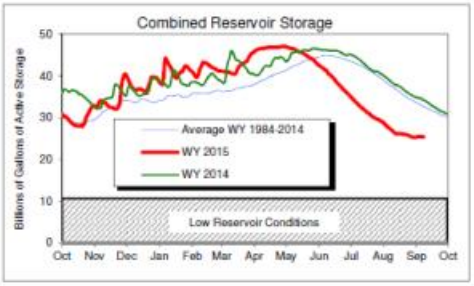
Seattle Public Utilities Water System Synopsis as of September 8, 2015



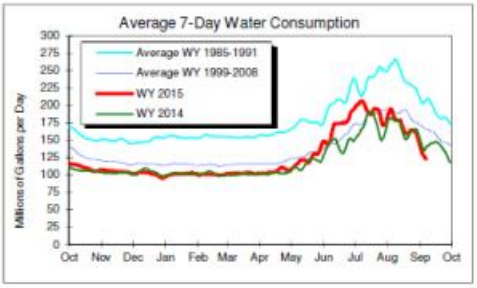
Precipitation was recorded in the Cedar River and South Fork Tolt River Watersheds over the past week.



The average snow accumulation across the sites that we monitor is estimated to be about 0.0 inches snow water equivalent which is at the long term average for this time of the year.

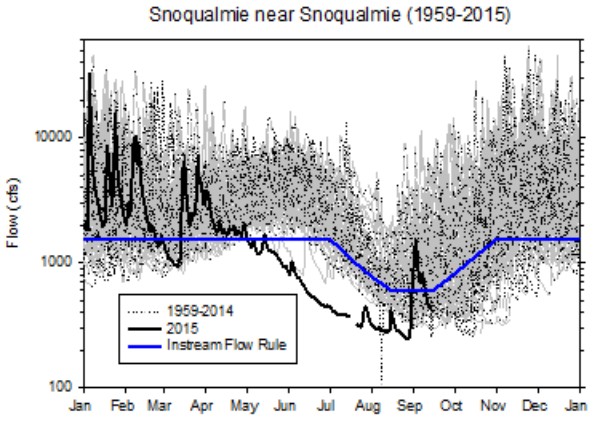


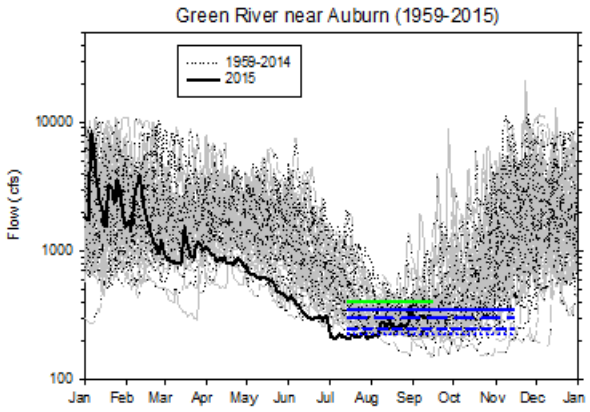
The combined reservoir storage of Chester Morse Lake, Masonry Pool, Lake Youngs and South Fork Tolt Reservoir is below the long term average for this time of the year.

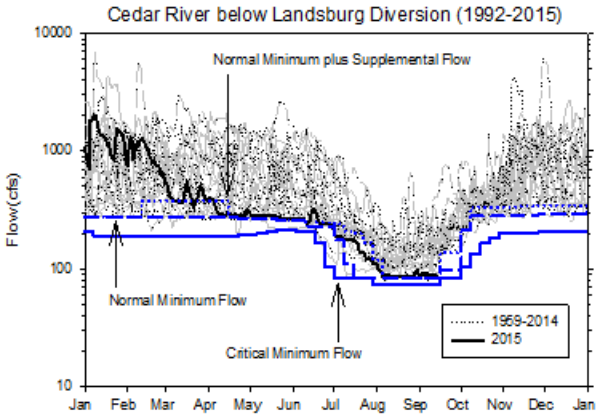


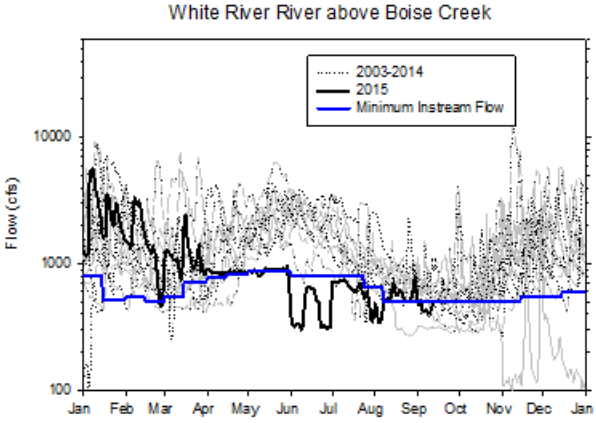
Water use over the past week averaged about 123 million gallons per day (mgd), which is less than the 166 mgd used during the same period over the years 1999-2008.

All data is provisional and subject to revision.

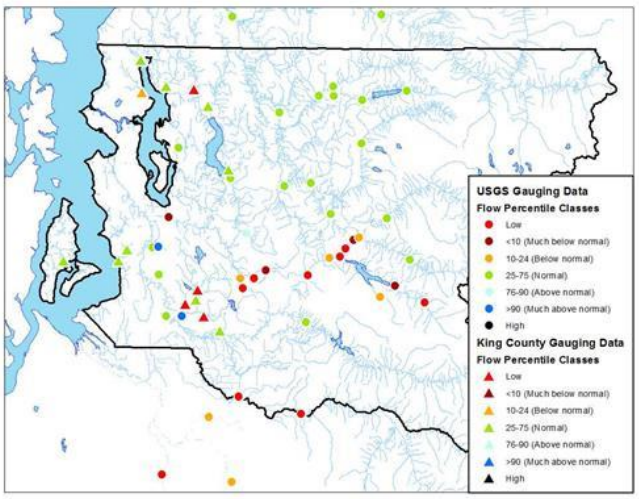




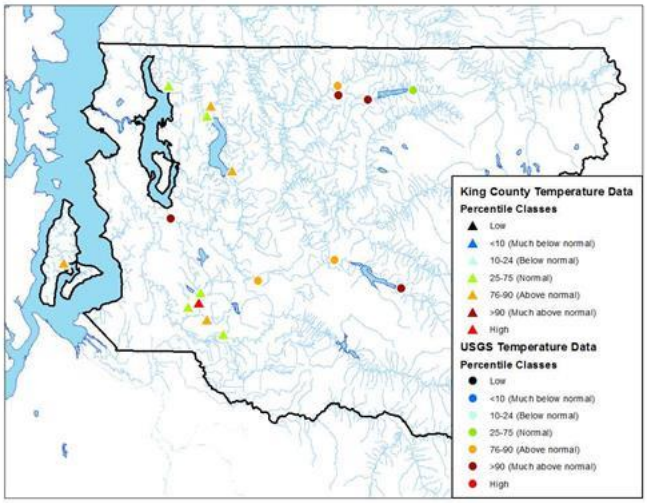




FLOW



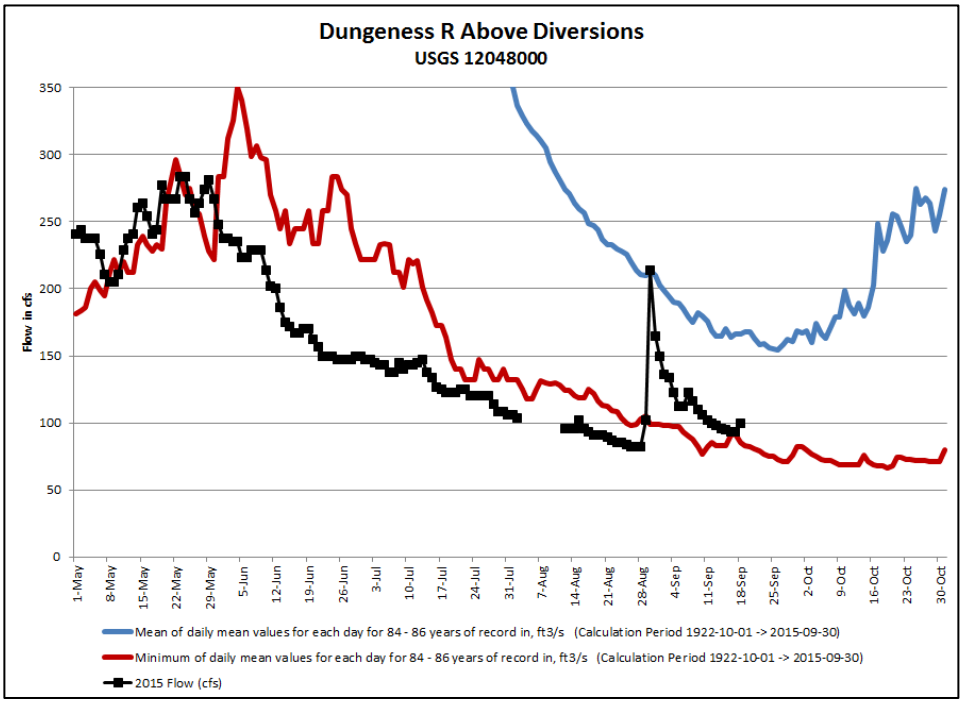
TEMPERATURE



Many thanks to Curtis and Jim for sharing this information with us! This is a very thorough overview of conditions in King County and this writer wishes she could apply this level of detail statewide!

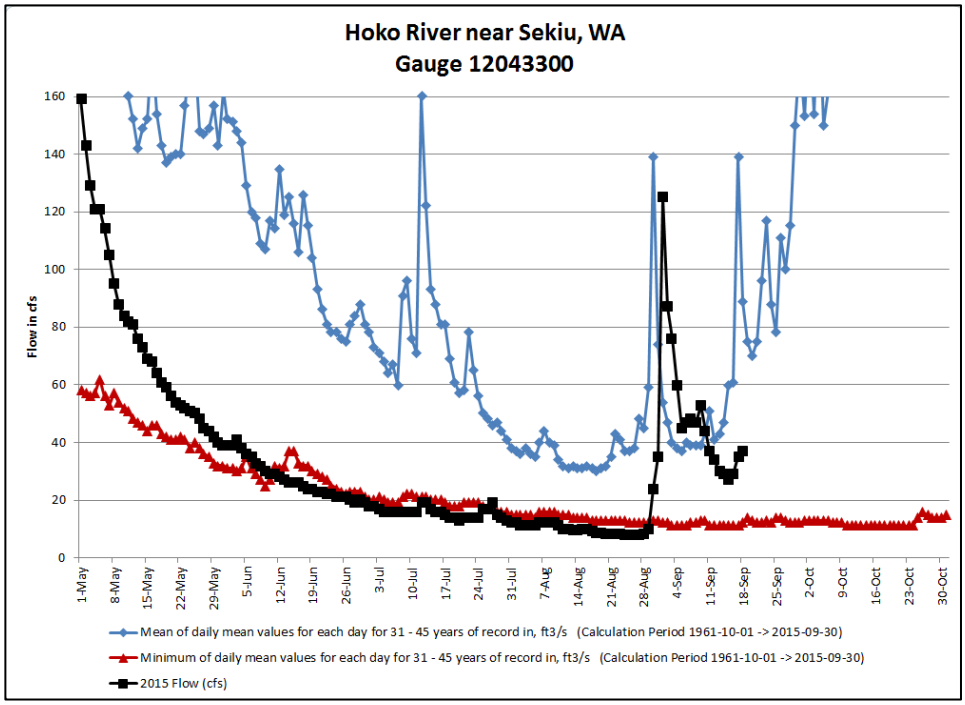
Dungeness & Western Strait

Flows in the **Dungeness** have returned to relatively lower levels (closer to historic minimums) than streams in Puget Sound. Irrigators ceased diversions for the season on September 15, though diversions of around 7cfs that support livestock and landscape watering continue year-round.



Fish migrations are still being facilitated by the temporary flow concentration structures installed by WDFW and Jamestown s'Klallam staff and WCC crews in August.

Hoko flows responded similarly to the Dungeness to recent rains, and the recovery brings Hoko out of record-low territory and closer to mean flows. Note the flow pattern here - it's one that's repeated for most west side and even some eastside streams: sharp bump from August 30-September 4, smaller bump September 9th.



Clallam and Jefferson Water Use Restrictions

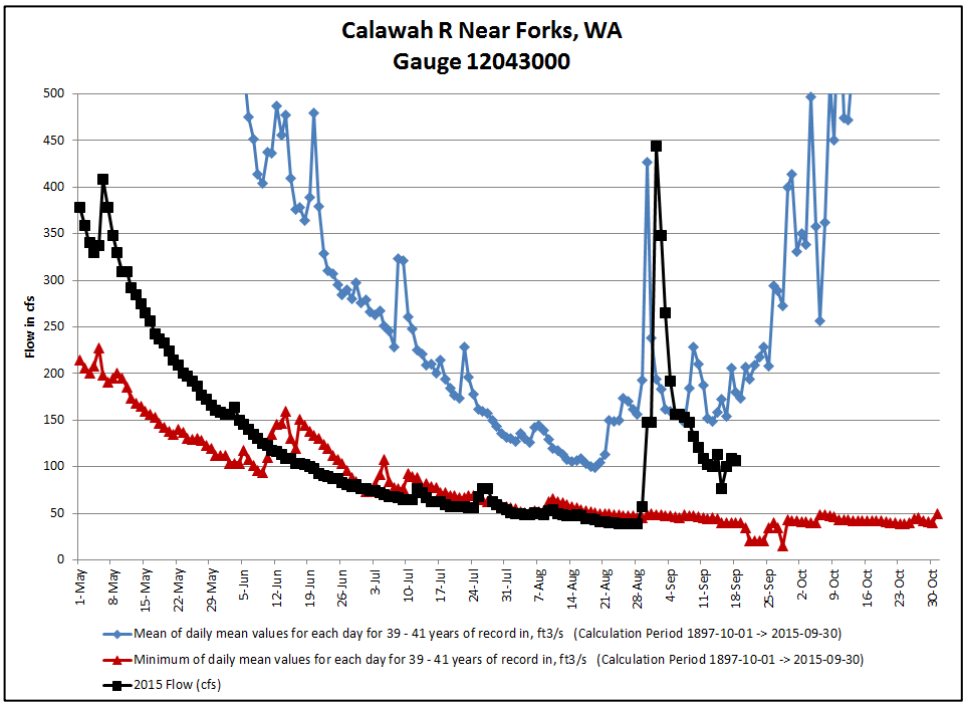
Mandatory emergency water restrictions are now in place for city water customers in and around **Forks**. The Forks water superintendent determined September 11 that a water emergency exists, and the city declared water use restrictions the same day. The restrictions apply to all users of the city water system, both inside and outside city limits. The mandatory restrictions follow voluntary water restrictions implemented in late June in preparation for a forecasted dry summer. Under the emergency restriction, only "essential water uses" are allowed. Essential uses include water for commercial horticultural operations and watering home gardens, according to city water ordinances, but lawn watering, pressure washing, and the filling of pools and hot tubs is prohibited. This is going to be tough on folks who waited until now to fill their swimming pools.

Port Angeles water customers and **Clallam County Public Utility District** neighborhoods east of the city served by Port Angeles water remain on Stage 3 restrictions put into place Aug. 5. Stage 3 restrictions also will remain in place for the Clallam PUD's **Fairview** Water District. A **Neah Bay** system with 40 customers is also on Stage 3 water restrictions. **Port Townsend** is in Stage 1 of a three-stage water conservation plan that went into effect Aug. 3.

Recent rainfall helped boost water levels in nearby rivers, but it was not enough to raise the groundwater supplying the Forks wells. This isn't surprising: Groundwater rarely responds immediately to precipitation, and sometimes the response can lag by months depending on the degree of connectivity between surface and ground waters.

North Coast

Calawah River values give us an indication of conditions in the Bogachiel, Dickey, Sol Duc, and Quillayute Rivers. Again, this hydrograph is similar to Dungeness and Hoko in that flows have not rebounded to record-lows, but are closer to midway between minimums and average.

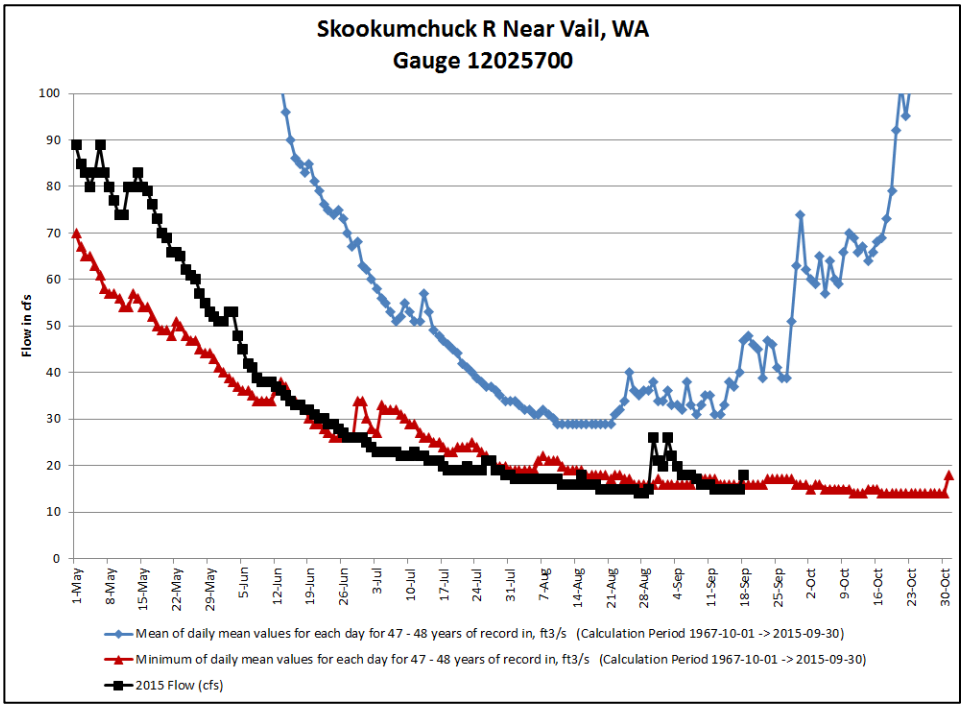


Chehalis Basin

Ecology has actively curtailed 93 water users and issued one compliance order as of August 28th.

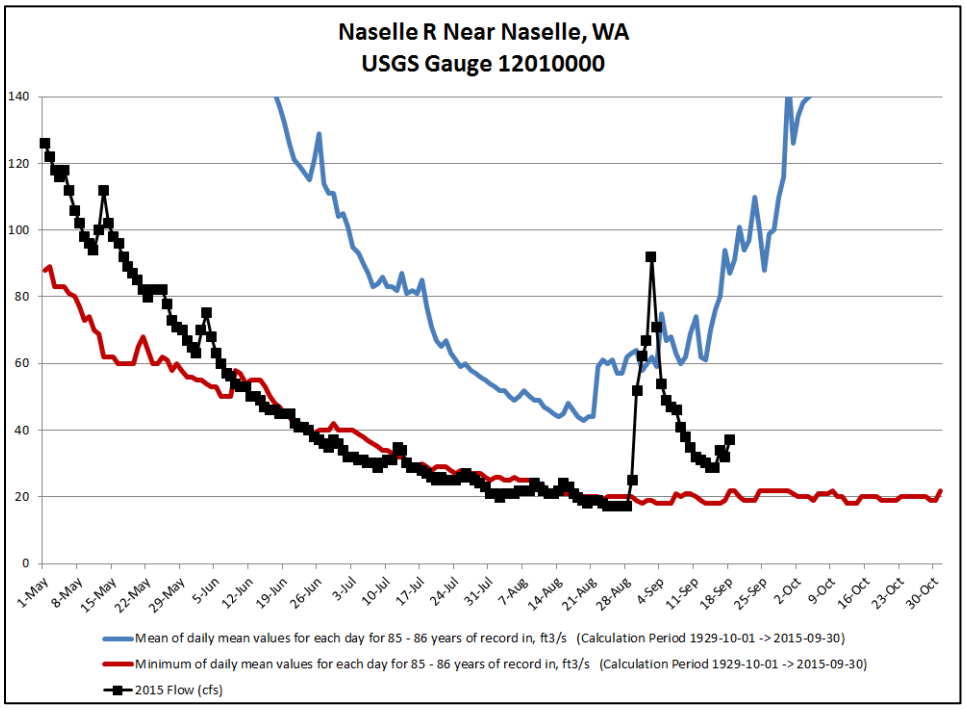
Skookumchuck:

Flows in the figure represent inflow to the Skookumchuck Reservoir. After a bump from the rains, flows have returned to near-minimum historic levels.

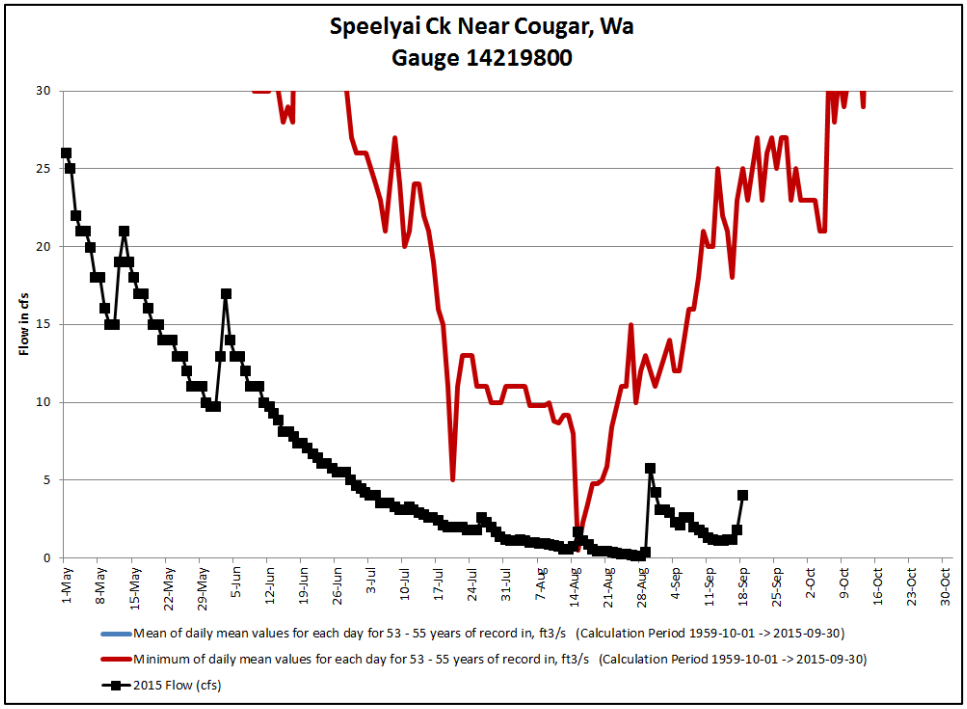


Southwest Region

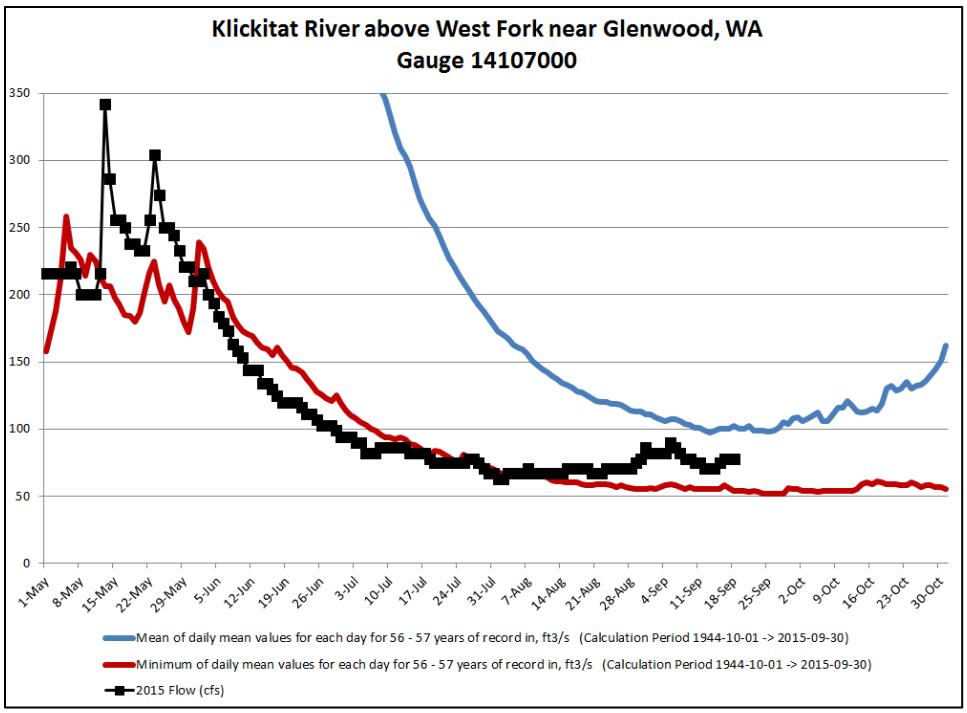
Naselle River shows a good response to recent rains.



Skeelyai Creek bumped above 5 cfs and hovers near 4 cfs. Again, it will be interesting to watch over the next couple of weeks how quickly the hydrograph starts its ascent for the year.

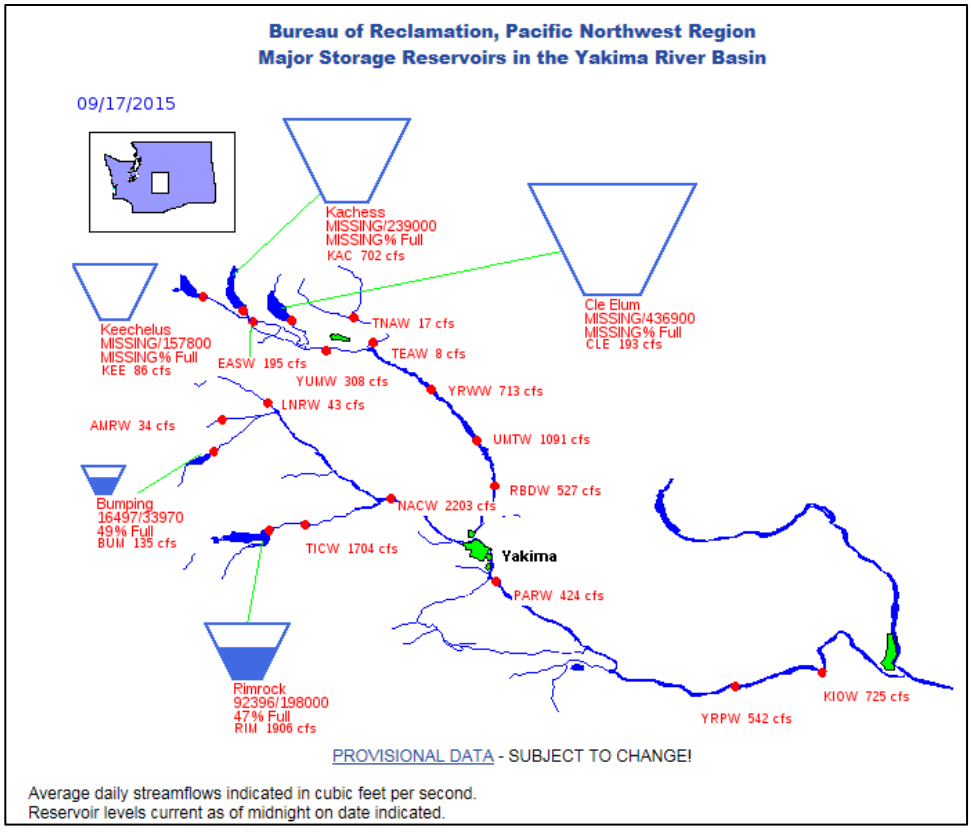


Looks like **Upper Klickitat** is on its seasonal ascent, but it's really too soon to determine this definitively.



Yakima

The Reclamation Teacup Diagram for Yakima Basin shows missing values for Lakes Keechelus (reported on the 9/17 system status report at 10%), Kachess (33%), and Cle Elum (7%). Bumping is at 49% of full, and Rimrock is 47% full. Storage is 63.1% of average (1981-2010).



Sunnyside Valley Irrigation District (ID) cut by 40cfs, Roza ID cut by 15cfs and Yakima Tieton ID cut by 10cfs on 9/17. The Kittitas canal and the KRD 1146 spillway will be reduced by about 50cfs, Kachess outflow will be reduced by about 50cfs, and flows in the Tieton will remain static.

Inflow to the five reservoirs is 80%, releases from the five are 86% and major canal diversions are 82% of average for September 17th.

Yakima water right curtailments by Ecology total 18 post-1805 rights, 55 Teanaway users, 32 Teanaway second-notice users, and 74 users on the Cowiche as of August 28th.

Yakima Fish Status

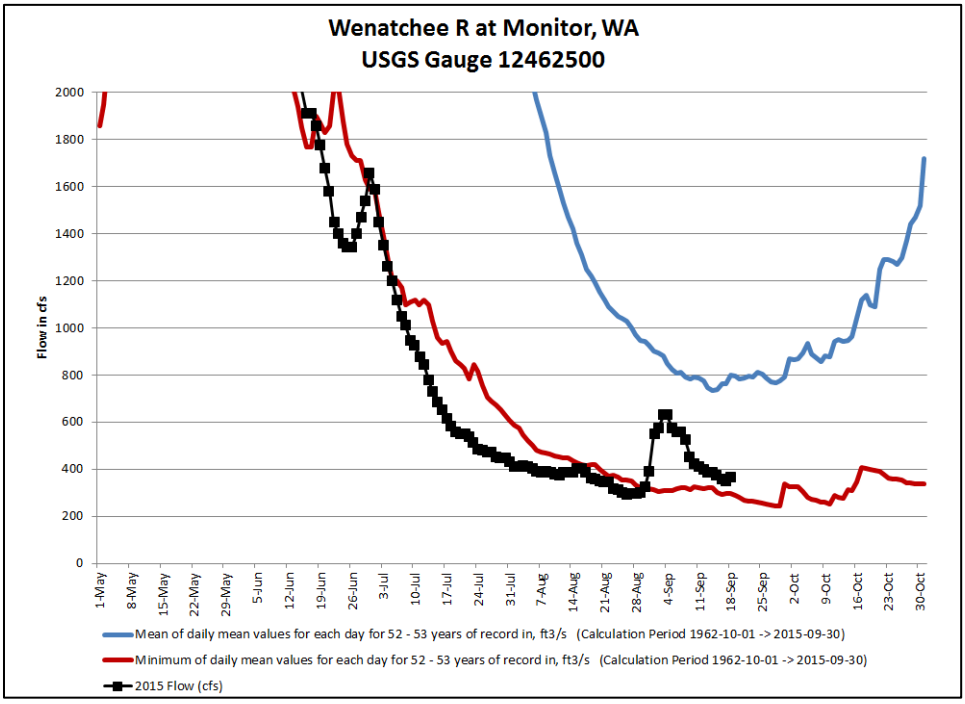
WDFW Correspondent Paul Hoffarth reports that the increasing flows in the Yakima River appeared to have moved the few remaining chinook staging at the mouth up river. There was a nice surge of summer/fall chinook through Prosser at the end of August/1st week of September. There was a decent fishery for salmon in the lower Yakima River (mouth to Prosser) for the first week of September (anglers caught a few fish!) and fall chinook fishing picked up dramatically during the week of September 7 in the Hanford Reach. Anglers averaged roughly 1 chinook per boat on September 10th.

Fish counts for summer chinook and sockeye showed a marked perk-up of both species' returns starting the 1st of September! Almost 80% of the total of 183 sockeye returns at Prosser through September 9th came through after September 1st!

WDFW has removed trout fishing restrictions in the Yakima River Basin on American River, Williams Creek and Swauk Creek and its tributaries. Ahtanum Creek, Little Naches River, and Teanaway River remain closed to fishing.

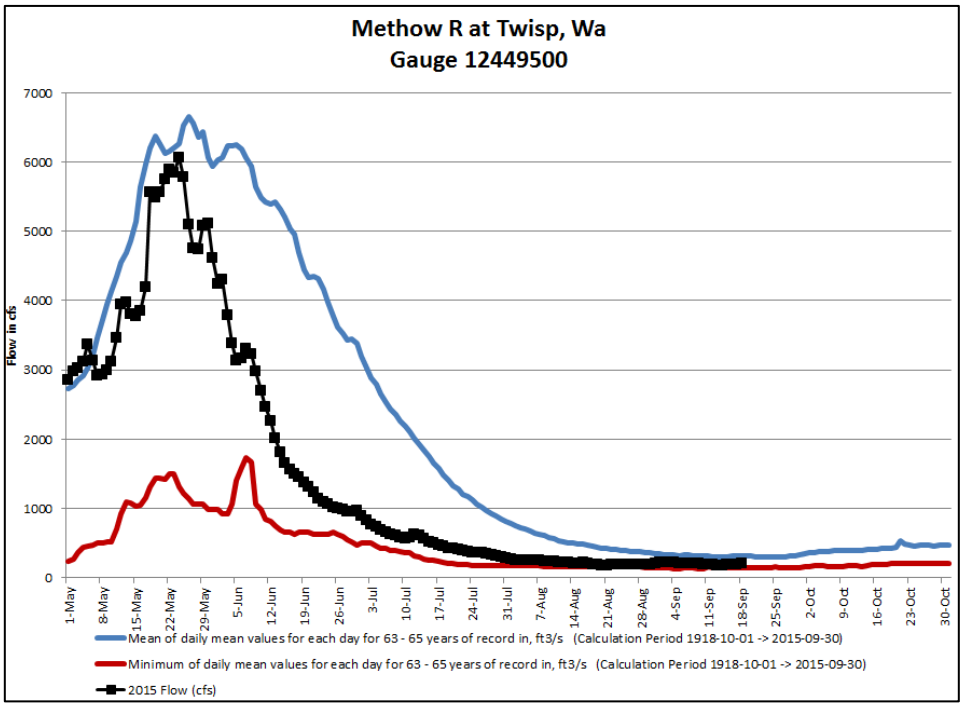
North Central Washington

Wenatchee flows recovered to a little above historic low flow levels, and we should be able to detect the seasonal ascent of flow levels through the next couple of weeks. We hope. Ecology has curtailed 91 Wenatchee basin water users through August 28.



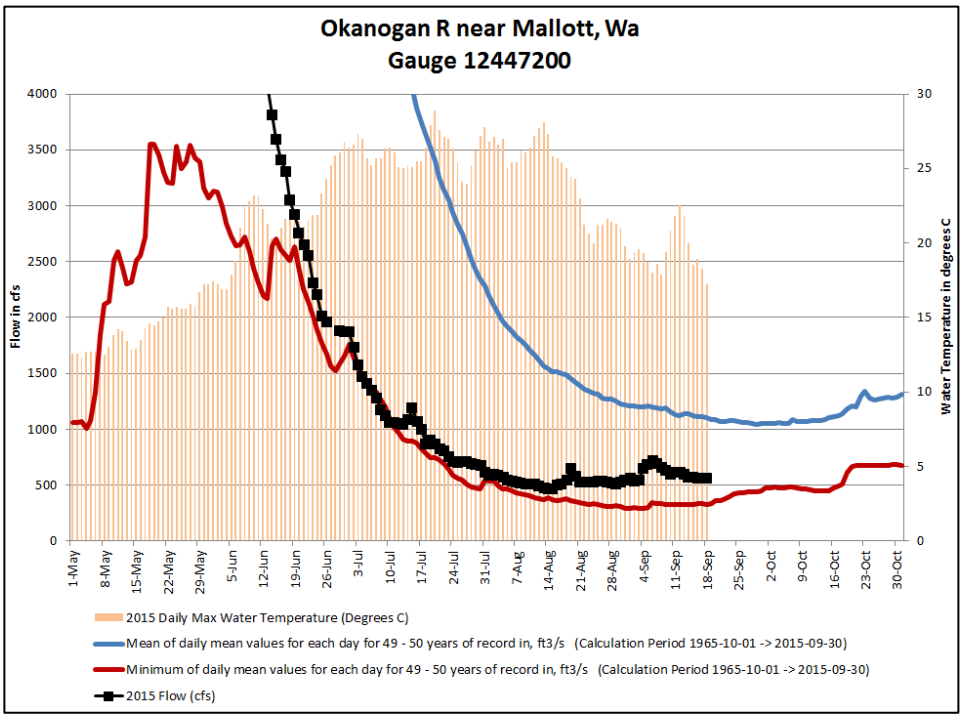
Methow flow (next page) is currently tracking with its historic hydrograph and low base flows with almost no discernable response to precipitation. I would appreciate hearing whether it has actually rained here! Contrast the Wenatchee hydrograph (above) with the Methow River

at Twisp: the seasonal ascent on the Methow doesn't begin until much later in the water year - Late April and into May as shown on this chart. Indeed, low winter flows are a concern here such that a fixed-quantity transfer of a seasonal water right (April to October, usually an irrigation right) into a year-round right (for drinking and landscape water, for example) is cause for great scrutiny. In most systems, a transfer of a fixed quantity of water from seasonal to year-round use usually means that summer-season use is lower than it had been historically, leaving more water in the stream during summer low flow season.



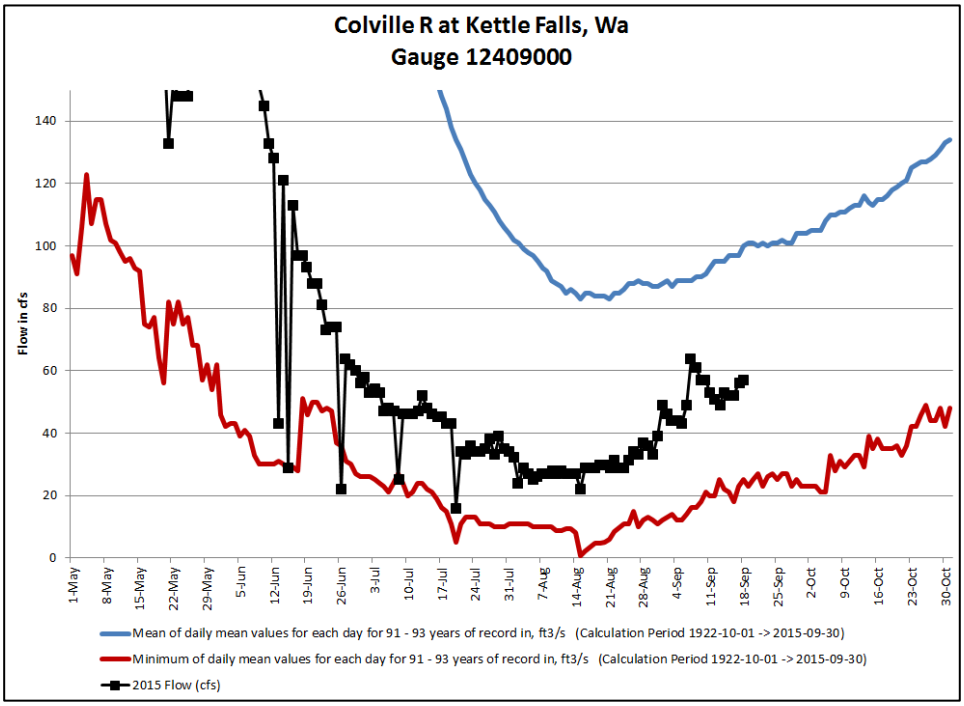
Ecology has curtailed 70 water users in the Methow.

Okanogan River flows have tapered off, even as temperatures continue to reduce. Ecology has curtailed 101 water users in the Okanogan /Similkameen basins, with one compliance order active.



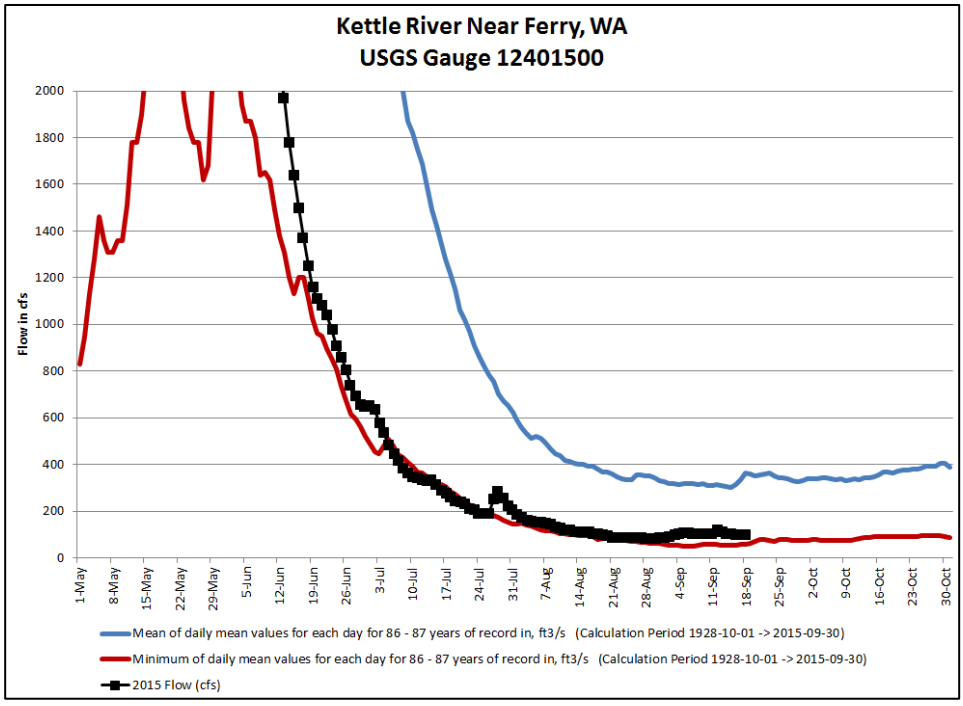
Spokane, Northeast, and Southeast Washington

Colville River flows have begun their seasonal ascent, and remain in the middle of the lower-than-average range.



Kettle River flows are low and appear to be leveling off.

As of August 28, Ecology has curtailed 55 water users in the Colville Basin, 140 in the Little Spokane Basin, 84 in the Walla Walla/Touchet basins, 15 in Tucannon/Asotin basins, and 41 water users elsewhere in the eastern region. There are also 34 compliance orders active in this region.



Snake & Columbia Rivers

Lake Roosevelt is at 1,280.6 feet elevation (9-13-15) and has held steady over the last week. Outflows at Grand Coulee have ranged between 51.1 and 89.1 Kcfs over the last week. Dworshak is currently at an elevation of 1,523.4 feet (9-13-15) and drafted 4.6 feet over the last week. Outflows have been 5.9 Kcfs over the last week.

The Columbia River mainstem in Washington benefitted from extra Canadian water releases during May and June this year to help salmon outmigrants speed to the estuary and ocean. There are two agreement mechanisms by which Columbia River mainstem flows can be improved in dry water years like this one through the operation of Canadian projects. The first is under the Columbia River Treaty operation. During dry conditions in the region, the Treaty specifies that more water is required to be released from Canadian storage in order to ensure power load levels are met across the region (i.e. to ensure that U.S. facilities receive enough water to generate the U.S. share of regional power). The result is that Treaty projects in Canada do not refill at the end of the summer as they would under more average water conditions. The second mechanism is the "dry water year release right" under the Columbia River Non-Treaty Storage Agreement (NTSA), a BPA-BC Hydro agreement. The NTSA addresses Canadian Columbia River storage built in excess of the amount identified under provisions of the Columbia River Treaty). Under the NTSA, BPA has the right to request Canada to release of 0.5 million acre-feet of water during May and June in the driest 20% of water conditions. BPA requested and received that water in 2015. Under the NTSA, this option is not available if it was exercised the previous year, so NTSA dry-year water will not be available to us in 2016. (Many thanks to correspondent Pamela Kingsbury of BPA)

WDFW Headquarters Drought Response Activity

Staff drought resources are available on the WDFW shared drive at S:\All Agency\Shared Projects\DROUGHT 2015.

Drought-related hatchery fish mortality through September 17

Mortalities are shown for drought-caused losses only. "% Production" represents the % lost of the total production of the identified species at that facility.

Region	Facility (Species)	Mortality (% production)	Transfers & Releases
3	Naches Hatchery	-0-	Two new wells have been drilled at this facility to replace the previous unreliable water supply.
4	Bellingham (Rainbow Trout)	5,760 (80%)	
4	Issaquah (Coho)	6,728 (1%) cum.	
4	Soos Creek (Summer Steelhead)	41,308 (60%)	
4	Soos Creek (Coho)	172,963 (21%)	Shipped 480,000 coho to Keta Creek Complex (Muckleshoot). This is a normal activity that was executed early this year.
4	Icy Creek (chinook)	-0-	107,000, or 33%, of the population was planted into the Green River on 7/29.

5	Grays River (Steelhead)	150,300 (93%)	450k type S coho were moved to Cowlitz Trout Hatchery on July 28th and 29th due to low water supply at Grays.
5	North Toutle (Coho)	101,746 (76%)	On July 14, the remaining 33,600 Type S Toutle Stock Coho were moved to Cowlitz Trout Hatchery. The move was prompted by the losses due to columnaris (left). Moved fish recovered and mortality has dropped to 961 since July 14 or 2.7% of the remaining population
5	Lewis (chinook)	-0-	On Mon. Aug. 3rd 500k Spring were released (~38% of the Lewis Spring program). These fish were programed for an Oct. release, however early smoltification and Bacterial Kidney Disease prompted this early release to meet optimal fish health and river conditions.
5	Speelyai (kokanee)	-0-	Fall Kokanee program released early due to construction of new intake at facility.
5	Vancouver	-0-	Well level is dropping so plans are underway to plant 15K brown trout early.
5	Washougal (Coho)	37,000 (2%)	
6	Elwha	0 (0%)	Staff is working to develop a replacement well at this facility
6	Forks Creek (Steelhead)	14,489 (24%)	
6	Lake Aberdeen (Steelhead)	64,903 (22%)	
6	Naselle (Steelhead)	64,989 (22%)	
6	Naselle (Coho)	639,646 (44%)	
6	Voights Creek (Coho)	347,000 (44%)	

Information about status of drought-related fisheries changes can be found at http://wdfw.wa.gov/conservation/drought/ .

News Clips

Bluetongue virus confirmed in white-tailed deer in eastern Washington
Washington Department of Fish and Wildlife - September 18, 2015

High domoic acid levels likely to delay start of razor clam season
The News Tribune - September 18, 2015

Earth's Record Streak of Record Heat Keeps on Sizzling
New York Times - September 18, 2015

Rivers cooling off for fish, but low water levels still a problem
Methow Valley News - September 18, 2015

Scientific Panel Calls For Reforms To US Forest Fire Policies
OPB - September 18, 2015

WA, OR Mountain Hunters Finding Bucks, Snow
NW Sportsman - September 18, 2015

Congress is about to let the Land and Water Conservation Fund lapse. Here's why you should care.
Washington Post - September 18, 2015
Birds are back: Upland birds, waterfowl numbers increase
Spokesman Review - September 17, 2015
Hopes high for a 'Super' El Niño
High Country News - September 17, 2015
CRP grazing extended for fire, drought victims
Capital Press - September 17, 2015
Toxic algae blooms invade Washington's coast
TVW - September 17, 2015
Consecutive mild winters have allowed whitetails, elk to thrive across region
The Spokesman-Review - September 17, 2015
OUTDOORS: Salmon retention reopened on lower stretches of the Hoh River
Peninsula Daily News (AP) - September 16, 2015
For fragile drylands, climate change is crushing
Conservation Science - September 16, 2015
Fires impact Okanogan County's already hard-hit wildlife
Wenatchee World - September 16, 2015
Drought-related blue-tongue outbreak killing area deer
Spokesman Review - September 16, 2015
Yakima reservoir levels likely to be half of normal by end of season
Yakima Herald - September 16, 2015
Columbia fall chinook run upgraded to 3rd largest on record; other factoids
Spokesman Review - September 16, 2015
Forks implements emergency water restrictions due to well levels
Peninsula Daily News - September 14, 2015
Look for fish as they return to King County rivers and streams | King County
The Enumclaw Courier Herald - September 15, 2015
Wildfire reality in our region: 'The future is here now'
Methow Valley News - September 15, 2015
Some Clallam County beaches reopen to shellfish harvesting
Peninsula Daily News (AP) - September 14, 2015
Massive wildfires devastate tribal timberlands
Seattle Times - September 15, 2015
Ranchers search for path to recovery after Okanogan wildfires
Seattle Times - September 14, 2015
No Plans To Halt State Humpy Fishery On Skagit
NW Sportsman - September 14, 2015
Feds: Sage-grouse populations threatened by wildfires
The Seattle Times - September 13, 2015
More closures lifted, except lower South Fork
The Bellingham Herald - September 12, 2015
Clam seasons doubtful because of domoic acid
The Daily News - September 11, 2015
For Salmon Feeling the Heat, Effects Will Last
The Chronicle - September 11, 2015
Fraser River pink salmon run a poor haul for U.S. fishermen
The Bellingham Herald - September 11, 2015

Links

Ecology's "Washington Drought 2015"

Ecology Dam Safety web page ***Wildfire Impacts on Dams***

Washington State Climatologist **weekly drought update for Washington State**.

Drought web pages for State departments of **Health** and **Agriculture**

National Integrated Drought Information System **Pacific Northwest Drought Portal**

NOAA **El Nino Portal**

NOAA's Climate Prediction Center

Northwest River Forecast Center Water Supply

USGS **Real time stream data for Washington**

U.S. Army Corps of Engineers **Seattle District Reservoir Control Center**

Rich Landers Outdoors Blog Spokesman Review – ongoing

Concerns mount as drought deepens Columbian Special Project July 11, 2015

Washington Wildfire Resources

Social media fire updates are available on #waWILDFIRE

For Further Information:

Drought-related staff resources are available on the "S" drive at S:\All Agency\Shared Projects\DROUGHT 2015. Contact WDFW Drought Coordinator Teresa Scott at teresa.scott@dfw.wa.gov or (360) 902-2713 with questions and suggestions.